EA-1044; Environmental Assessment Melton Valley Storage Tanks Capacity Increase Project - Oak Ridge National Laboratory Oak Ridge, Tennessee April 1995

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ACRONYMS AND ABBREVIATIONS

ALARA - as low as reasonably achievable
BMAP - Biological Monitoring and Abatement Program
Ci/gal - curie per gram
CFR - Code of Federal Regulations
CWA - Clean Water Act
DOE - U.S. Department of Energy
EA - environmental assessment

EDE - effective dose equivalent
EIS - environmental impact statement
EPA - U.S. Environmental Protection Agency
FFA - Federal Facilities Agreement
FONSI - finding of no significant impact
FWS - U.S. Fish and Wildlife Service
GW - gaseous waste
HEPA - high-efficiency particulate air (filter)
HFIR - High Flux Isotope Reactor
HNO3 - nitric acid
HSWA - Hazardous and Solid Waste Amendments
LGWOD - Liquid and Gaseous Waste Operations Department
LLLW - liquid low-level waste
MSL - mean sea level
MVST - Melton Valley Storage Tank
nCi/g - nanocurie per gram
NAAQS - National Ambient Air Quality Standards
NaOH - sodium hydroxide
NEPA - National Environmental Policy Act of 1969
NFPA - National Fire Protection Association
NFS - Nuclear Fuel Services, Inc.
NOI - Notice of Intent
NPDES - National Pollution Discharge Elimination System
NW - nonradiological waste
ORNL - Oak Ridge National Laboratory
ORR - Oak Ridge Reservation
OSHA - Occupational Safety and Health Administration
PMF - probable maximum flood
PM-10 - particulate matter—10 µm in diameter
PVC - perforated polyvinyl chloride
PW - process water
PWTP - Process Waste Treatment Plant
RCRA - Resource Conservation and Recovery Act
REDC - Radiochemical Engineering Development Center
SHPO - State Historic Preservation Officer
SLLW - solid low-level waste
SWSA - solid waste storage area
TDEC - Tennessee Department of Environment and Conservation
TRU - transuranic
TSCA - Toxic Substances Control Act
TWRA - Tennessee Wildlife Resources Agency
U - uranium
WEAF - Waste Examination and Assay Facility
WMRAD - Waste Management and Remedial Action Division

SUMMARY

The U.S. Department of Energy (DOE) proposes to construct and maintain additional storage capacity at Oak Ridge National Laboratory (ORNL), Oak Ridge, Tennessee, for liquid low-level radioactive waste (LLLW). New capacity would be provided by a facility partitioned into six individual tank vaults containing one 100,000 gal LLLW storage tank each. The storage tanks would be located within the existing Melton Valley Storage Tank (MVST) facility. This

action would require the extension of a potable water line approximately one mile from the High Flux Isotope Reactor (HFIR) area to the proposed site to provide the necessary potable water for the facility including fire protection. Alternatives considered include no-action, cease generation, storage at other ORR storage facilities, source treatment, pretreatment, and storage at other DOE facilities.

If construction were undertaken during the winter and spring months when water tables tend to be elevated, groundwater seepage into the working area could occur. Seepage water control would require maintenance of graded slopes to areas where gravity drainage would carry the water to the ephemeral drainage channel to the east of the site. Portions of the trench for the potable water pipeline could be below the groundwater table. During construction activities, water would accumulate in the trench and would have to be pumped out of the trench, resulting in a temporary localized lowering of the groundwater table. Containment features incorporated into the design of the MVST Capacity Increase Project (from now on referred to as the proposed site) (e.g. sloped floors, dikes, and lined and monitored sumps) would minimize the potential for movement of contaminants from these facilities into groundwater.

Site regrading of 1.5 acres for the proposed site could result in soil erosion and subsequent sedimentation in nearby bodies of water. Best management practices using barriers such as silt fences should minimize impacts. Under conditions of unusually wet weather, influxes of runoff into construction areas could result in increased temporary erosion and sediment transport to the ephemeral drainage east of the site. Offsite perennial streams would not be impacted.

Clearing approximately 2 acres for construction of a water line from HFIR to the proposed site would result in the potential for erosion and sediment transport into Melton Branch. The potential for impacts to Melton Branch would be greatest during construction of the water line where it would cross Melton Branch. An elevated pipeline would be used to cross the stream so that there would be no construction through the stream channel; however, sedimentation could occur from construction in the immediate vicinity of the stream. In order to minimize impacts to the stream, construction equipment would use existing roads to access the pipeline route on either side of the stream; and use of practices such as erosion fences or hay bales for sediment retention would minimize potential impacts to adjacent surface waters and aquatic biota. Because the total area that would be affected is small, clearing it should have little impact on the terrestrial ecology of the region. A Tennessee Aquatic Resource Alteration Permit would be required for the water pipeline crossing of Melton Branch. In compliance with 10 CFR 1022, a Floodplain Assessment was done for the water pipeline crossing over the Melton Branch floodplain.

Sedimentation impacts to aquatic biota in upper Melton Branch as a result of clearing and construction at the proposed site and along the pipeline route would be minimized by sediment fences and measures to prevent sediment and any stored hazardous materials (e.g., fuels used during construction) from being carried by runoff from the site. Measures to minimize the overall impacts on aquatic resources in Melton Branch from construction of the expanded site and the pipeline would protect both the diversity and density of benthic invertebrates in the upstream reaches of Melton Branch. After completion of the proposed construction and subsequent soil stabilization activities, only minimal potential should exist for impacts from site runoff and sediment transport. Adequate maintenance of drainage control structures at the proposed site would be required to divert moisture or water flows around the facilities. Adverse impacts on surface water quality would not be expected from operation of the potable water pipeline.

The proposed storage tanks would be fully contained and enclosed, thereby minimizing the possibilities of LLLW coming into contact with surface waters or aquatic organisms. If a leak or spill occurred, the LLLW would be contained in single walled tanks surrounded by secondary containment that allow for sampling to determine potential leakage. Any accidental leakage from the storage tanks would be detected, using conductivity elements, and contained by the double-walled construction before it could reach the ground surface, surface water, or groundwater.

Adverse impacts on human health from radiation or chemical contamination would not be anticipated during the construction of the proposed facility. During incident-free operation, human exposures would be unlikely. Because the storage tanks would fully contain the LLLW concentrate, direct human exposure would not be of concern. In addition, nitric acid (HNO3) and sodium hydroxide (NaOH) would be transported by tanker truck to the truck station and pumped directly into the storage tanks, thereby avoiding human exposure. Low-probability accidents could cause the release of material to the environment and possibly the exposure and injury of on-site or off-site individuals. A break in the double-walled underground pipeline would not be expected to result in human exposure because the system is designed to shut down if a leak is detected to minimize spills of LLLW. A truck accident involving the transport of HNO_3 or NaOH could cause the release of a large quantity of these chemicals, which could pose an immediate danger to life and health if inhaled as vapor (HNO_3) or dust or mist (NaOH). Such an accident could result in acute exposure either through inhalation or direct contact. Adverse effects would require that an individual be in direct or close contact with the spill before it dispersed to non toxic levels; therefore, the truck driver would have the highest risk of exposure.

DOE has proposed the construction and operation of several other waste management activities in Melton Valley through the year 1995. Construction and operation of the proposed facilities in Melton Valley are not expected to have any major impacts on groundwater hydrology and quality, air quality, wetlands, archaeological resources, and human health and safety. The impacts of construction of the proposed site would make a minor, but detectible, contribution to the cumulative impacts to terrestrial ecology of all currently proposed, and reasonably foreseeable future DOE actions on the Oak Ridge Reservation (ORR). Each action may have insignificant impacts because each action by itself affects only a small area; however, in total, such actions have had cumulative impacts on ORR vegetation and wildlife.

1. INTRODUCTION

1.1 PURPOSE AND NEED

The U.S. Department of Energy (DOE) proposes to construct and maintain additional storage capacity at Oak Ridge National Laboratory (ORNL), Oak Ridge, Tennessee, for liquid low-level radioactive waste (LLLW) concentrate. The primary isotopes found in LLLW are strontium (^{90}Sr), cesium (^{137}Cs), curium (^{244}Cm), and europium (^{152}Eu). Based on analyses of existing LLLW at ORNL, the LLLW generated is characterized as a transuranic-contaminated mixed waste (Sears et al. 1990). Mixed waste refers to the mixture of radioactive and hazardous waste. The LLLW contains trace amounts of Resource Conservation and Recovery Act (RCRA) hazardous waste. The LLLW concentrate would include toxic compounds of nitrates, hydroxides, chlorides, carbonates, dilute water soluble organics, and some heavy metals in a few parts per million concentrations (Myrick 1992).

It is necessary to provide a way to handle LLLW now being generated (13,000 gal/year) and accommodate both present and future LLLW storage requirements. The Federal Facilities Agreement (FFA) (DOE 1992a) between the U.S. Environmental Protection Agency (EPA), the U.S. Department of Energy (DOE), and the Tennessee Department of Environment and Conservation (TDEC) requires that singly contained or leaking LLLW tank systems be upgraded or replaced to meet new secondary containment standards and leak detection requirements. The purpose and need for the action is to comply with the terms of the FFA by providing the additional storage capacity required to allow the LLLW system to remain operational and to support future operations and environmental restoration programs at ORNL.

1.2 BACKGROUND

ORNL, located in eastern Tennessee approximately 7 miles from the City of Oak Ridge (Fig. 1. General location of Oak Ridge National Laboratory (ORNL) in Oak Ridge, Tennessee), is a large, multipurpose DOE research laboratory, with a primary mission of expanding basic applied knowledge in areas related to energy. Facilities include a nuclear reactor, chemical pilot plants, research laboratories, radioisotope production laboratories, accelerators, and support facilities.

In the last 5 years, most of ORNL's LLLW has been generated by the Radiochemical Engineering Development Center (REDC), the Process Waste Treatment Plant (PWTP) and the HFIR (ORNL 1991) (Fig. 2. Location of proposed project in relation to Melton Valley and Bethel Valley facilities at Oak Ridge National Laboratory). LLLW continues to be generated from reactor operations and from cleanup and decommissioning of isotope production facilities. In addition, future facilities (e.g., a reactor) could be built that would generate LLLW. LLLW is collected through a liquid waste collection and transfer system. It is then concentrated by processing in the LLLW evaporator in Bethel Valley, and the resulting concentrate is pumped into the eight existing MVSTs that are nearly full (Fig. 3. Liquid low-level waste flow diagram showing Melton Valley Storage Tank Capacity Increase Project). Condensate from the evaporator is transferred to the ORNL process waste system.

2. THE PROPOSED ACTION AND ALTERNATIVES

2.1 PROPOSED ACTION—PREFERRED ALTERNATIVE

DOE proposes to construct and maintain an enclosed facility partitioned into six individual partially below-grade tank vaults containing one 100,000-gal LLLW storage tank each (Fig. 4. Proposed site of the Melton Valley Storage Tank Capacity Increase Project storage tank facility). The storage tanks would be located at ORNL in Oak Ridge, Tennessee (Fig. 1) within the MVST facility, 7800 Area (Fig. 2). This action would be adding to an existing LLLW system.

The proposed facilities would serve to store LLLW until a disposal option is decided (ORNL 1991). Three 100,000-gal tanks would be constructed in Phase A (completed by the year 1998) and three 100,000-gal tanks in Phase B (completed by the year 2000). Each tank would allow for 10% free board (unused capacity). Five of the tanks would be placed in general use, while one would be kept as emergency capacity. Storage capacity of 450,000 gal with a 90,000-gal reserve (total 540,000 gal) capacity would result. The new system will have the capacity to transfer waste back and forth with the existing system.

Along with the additional storage tanks, the facility would include the following: (1) a stainless steel lined vault adjacent to the tank vaults to provide containment for the associated process pumps and valves; (2) a ventilation system to maintain the tanks and vaults under negative pressure; (3) a buried and lined valve pit to connect the new piping to the existing MVST and the LLLW Evaporator in Bethel Valley; (4) a truck unloading station consisting of a diked concrete pad and piping connections capable of receiving chemicals from trucks or pumping liquid process waste into a process waste tanker; and (5) a control, instrument, and equipment room that houses support equipment required to operate the above facilities and equipment (Fig. 4). Extension of an underground potable water line a distance of approximately 1 mile from the HFIR area to the proposed MVST site would also be required (Fig. 2).

When ready for use, the new tanks would receive approximately 170,000 gal of LLLW currently in the existing LLLW system including the South Tank Farm (W-5, W-6, W-7, W-8, W-9, W-10) and North Tank Farm (W-1A, W-1, W-2, W-4, W-13, W-14, W-15) in Bethel Valley and the Old Hydrofracture Facility (T-1, T-2, T-3, T-4, T-9) in Melton Valley. Transfer of LLLW presently contained in these tanks is necessary to comply with the FFA stipulation that these singly contained or leaking LLLW tank systems be upgraded or replaced to meet new secondary containment standards and leak detection requirements. In addition, approximately 150,000 gal LLLW would be transferred from storage at the Evaporator Facility (Fig. 3). The new tanks would also accommodate small amounts of LLLW from 16 small tanks used by the Environmental Restoration Program during remediation activities. The remaining capacity of the new tanks (approximately 220,000 gal) would allow storage of 130,000 gal of LLLW from future ORNL operations with a 90,000 gal of reserve capacity. Project design lifetime would be 30 years and decommissioning would be evaluated under separate NEPA documentation.

2.1.1 Design Requirements

Design requirements for the proposed low-level radioactive waste tank system are established in Section IX, Appendix F of the FFA (DOE 1992a) between the EPA, DOE, and the TDEC. The primary objective of the FFA as it relates to the proposed action is to ensure that structural integrity, secondary leak containment and detection, and LLLW source control are maintained pending final remedial action at the site. The FFA also requires the transfer of LLLW from existing tank systems that are not in full compliance to tanks that comply with the FFA. The FFA regulations for detection and containment of releases in new tank systems are based on Section 264.193 of 40 CFR 264. The design of the proposed action will meet the leak detection requirements in 40 CFR 264 and 40 CFR 280 for the interstitial monitoring method, and the spill and overfill protection requirements in 40 CFR 280.20.

The vault structure would be located partially below grade as noted on Figure 5. The facility location/elevation was established to provide adequate bearing support for the vault foundation, and to minimize costs associated with rock excavation and disposal of excess cut materials not needed in site grading. Drainage piping would be provided below and around the perimeter of the vault structure to minimize the potential for groundwater inleakage into the vault during construction and operation. Locating the vault further below grade would drive site preparation costs higher and would increase the potential for groundwater inleakage.

2.1.2 Site Development

The proposed project site plan and site location are shown in Figs. 4 and 6, respectively. Site development would be done in accordance with DOE Order 4320.1B (Site Development Planning). A previously conducted Health Physics survey of the area found no evidence to indicate radioactively contaminated soils at the site (Anderson 1991). Site work will consist of excavation (Fig. 5. Cross section of the vault structure design) (approximately 8 ft below grade) and minimal grading to provide proper subgrades for the new tank vault and truck loading station. Stripping and stockpiling the top layer of gravel (approximately 1.5 ft) would be included. This gravel would be used in developing a final grade or for access road and laydown area construction (DOE 1992a).

Storm water management would be required to ensure that precipitation runon and runoff would not come in contact with chemicals or LLLW. Perforated polyvinyl chloride (PVC) pipes would be provided around the vault facility for foundation drainage. In addition, containment features including sloped floors, dikes, and lined and monitored sumps would be incorporated into the design of the project.

The access road to the truck unloading station would be connected to the existing road south of Building 7860 (the New Hydrofracture Building) as shown in Fig. 6. The access road would be required to accommodate acid [nitric acid (HNO3)]/caustic [sodium hydroxide (NaOH)] transfer tankers and trucks, transport trailers, maintenance vehicles and small trucks. The service road would be located north of the Control and Equipment Building and would provide access for maintenance work at the outlet high-efficiency particulate air (HEPA) filter platform and control building.

2.1.3 Utilities

The required utilities for this project would be potable water, fire protection water, process water, instrument air, fire alarm, voice and data communications and electrical power.

Extension of a potable water line from the HFIR area to the proposed site would be required to provide the necessary potable water for the eye wash/safety shower at the truck station, fire protection water, and process water and lines for flushing LLLW lines after LLLW transfers. A new underground potable water main (3 ft deep) would be connected to the existing potable water line near HFIR and extended approximately 1 mile to the proposed site as shown in Fig. 6. This pipeline would be elevated to cross Melton Branch to avoid construction through the stream channel.

Fire protection piping would be designed and sized in accordance to National Fire Protection Association (NFPA) standards (NFPA–13 and –24). Sprinklers would be installed in the control room, instrument room, and equipment room. A fire detection and alarm system meeting the requirements of NFPA-72 would be installed. The fire alarm system would include a master fire alarm box, local energy fire alarm control panel, automatic and manual initiating devices, and a lightning arrestor (Fig. 6. General layout of the Melton Valley Storage Tank Capacity Increase Project and water line extension) Electricity would be provided by extending an existing circuit system around the existing Waste Solidification Facility to a new pole located at the west side of the control building.

2.1.4 Buildings

Buildings for the proposed site would include a concrete vault structure containing the 6 new storage tanks, pumps, and valves; a control building; and a truck station (Fig. 4). The vault would house the six storage tanks, and, in a separate area, the pumps and valves. The valve and pump and the tank vaults would be lined with stainless steel liners and sloped to monitored, lined sumps. The Control and Equipment Building would be a separate 840 sq. ft concrete block building containing three rooms (control, instrument, and equipment rooms).

The truck station would have the capability to accommodate a 40-ft semi-tractor/trailer process waste truck as well as smaller chemical supply trucks. The station would consist of a check valve, transfer line connection point; a sloped and diked concrete truck staging pad; and a monitored sump. A safety shower and eye wash station would also be located at the pad.

2.1.5 Process Equipment—Phase A

Three 100,000-gal capacity tanks would be installed during Phase A of the project, providing 270,000 gal of usable storage capacity and 10 percent free board. The tanks would be the single-wall, horizontal type, constructed of stainless steel. Each tank would be approximately 16 ft in diameter by 68 ft long, supported by stainless steel saddles. A layout of the storage tanks is shown in Fig. 4.

The double-wall, buried transfer line would change to single-wall pipe upon entering the lined valve and pump vault. The line would then connect to a pipe manifold capable of diverting flow to any of the tanks by the proper valve operation. The lines would be sized to achieve required transfer rates between any of the storage tanks or back to the evaporator in Bethel Valley. Chemical addition piping would be provided to allow for chemicals for pH adjustment to be unloaded at the trucking station and added to any of the tanks.

2.1.6 Process Equipment—Phase B

In Phase B, three 100,000-gal storage tanks would be installed, providing 180,000 gal of usable storage capacity, 30,000 of unused capacity, and a spare tank (90,000 gal of reserve capacity) for emergency use. Completion of Phase B would bring the proposed site usable storage capacity up to 450,000 gal with 90,000 gal reserve capacity. The same pumps installed during Phase A would be used for Phase B. Tank vault liners, tanks, ventilation, and piping identical to those used in Phase A would be installed in Phase B.

2.1.7 Collection and Transfer Piping

The ORNL LLLW system flow is shown in Fig. 3. The primary LLLW transfer direction is from the Bethel Valley evaporator to the MVST storage tanks. An existing transfer line from the evaporator in Bethel Valley to the MVST site would be used for the proposed project. The interface with the existing system would be at a tie-in with the existing transfer line where it enters the MVST pipe tunnel. A lined concrete valve box would be constructed at this tie-in. Valves would be provided to tie into the line so that transfers can be diverted to either the existing MVSTs or to the new storage tanks. In the event that a leak is detected either by the liquid detection or annulus pressure instrumentation, the transfer pumps would be shut down and the valves closed to isolate the system. Liquid which accumulates in the vault or valve box sumps as a result of a leak would be transferred to a storage tank after the transfer line and tank integrity are confirmed.

2.1.8 Special Equipment

Tank sampling would be done manually using a grab-sample device totally contained within a glove box shielded enclosure. This enclosure would be lifted and transported from one sample port to another on the three adjacent Phase A or Phase B tanks by an A-frame hoist, which would traverse on a trolley beam between the tanks. The samples would be analyzed about every two years for specific chemical and radionuclide content based on program and operational needs. HNO3 and NaOH, chemicals used to adjust pH of the tanks, would be transported by tanker truck to the truck station and pumped directly into the storage tanks, if required. The tanker truck holds two tanks, one for the acid and one for the caustic chemical. The acid tank holds approximately 500 gal of HNO3 and the caustic tank holds approximately 300 gal of NaOH. Only one chemical would be transported at a time.

The Central Control System located in the control building would provide the capability to monitor the operation of the facility and provide all nonsafety-related interlock and supervisory control. Safety systems would be controlled separately from the Central Control System and would ensure the termination of LLLW transfer in the event of a pipe break. These systems would be designed with the necessary redundancy to ensure that a single failure would not lead to a system malfunction.

2.1.9 Operation

Operation of the facility involves two primary tasks: (1) transferring LLLW to and from the facility and (2) monitoring the stored waste. LLLW would be transferred to and from the facility by utilization of the existing LLLW system (Fig. 3). During waste transfers, personnel would be at the site to operate piping controls and locally monitor systems. The stored waste would be monitored in several ways: (1) level indicators and remote alarms would be monitored continually at the existing Waste Operations Control Center located in Bethel Valley, and operating personnel would take local instrument readings at least once a shift; (2) the stored waste would be sampled periodically for chemical analysis as required to satisfy programmatic and operational needs; and (3) the immediate surrounding area would be periodically monitored for possible contamination. The conductivity elements to be employed for detection of liquids in sumps will alarm on a failure. Redundant instruments are provided in the case where detection of leakage is taken credit for in the Safety Analysis Report (40 CFR 280.43).

The tanks, tank vaults, and pump and valve vault would be maintained at a partial vacuum. The tank ventilation system (HEPA filters to remove particulate radionuclides) would be separate from the vault system. The inlet to the tank vault system and outlets of both systems are HEPA filtered to remove particulate radionuclides. HEPA filters will be disposed of in accordance with established procedures. Based upon radionuclide emissions from the existing MVST stack and conservatively estimated ventilation flow rates for the proposed capacity increase, dose assessment modeling using the EPA approved methods demonstrated that emissions result in an effective body dose less than 0.1 mrem/year at the property line and at a maximally exposed receptor location. Consequently, neither a State nor a Federal air permit is expected to be required (ORNL 1993a). During normal operations only the tank ventilation outlet would release minimal amounts of airborne radionuclides. The tank and the vault air inlets would also incorporate heater units to keep the tanks from freezing during extremely cold periods. The tank inlet and outlet ducts would be equipped with connections for nitrogen purge. Should the combustible gas monitors detect unacceptable levels of combustibles in the tank exhaust ducting, the tanks could be purged with nitrogen by connecting the purge piping to a nitrogen supply. This action would purge the tank atmosphere and would create an atmosphere incapable of sustaining combustion.

Transfer pump pressure, vault pressures, and tank pressures would be monitored. Alarm settings would be provided to indicate that waste levels were approaching 90% of tank capacity. Instrumentation for primary and secondary ventilation would consist of temperature elements, differential pressure transmitters, and flow monitors. Flush water connections that extend through the vault roof would be provided for all process equipment.

The diked truck loading/unloading station would be provided to facilitate off-loading of vault sump accumulations determined to be process waste and to allow for the off-normal addition of chemicals for pH adjustment.

2.1.10 Best Management Practices

Best management practices would be employed as part of the proposed action to minimize impacts on the environment. These include (1) erosion control (hay bales, silt fences), (2) dust suppression (surface wetting agents), (3) minimization of removal of hardwood forest, and (4) revegetation with native species to stabilize soil erosion. In addition, groundwater impacts would be minimized by controlling seepage of groundwater at construction sites providing drainage piping below and around the perimeter of the vault structure, avoiding contact with groundwater, and backfilling permeable material in the potable water pipeline trench. During operation, the tank leak detection system and visual walk through inspections would minimize impacts to the environment. The Vault tank exhaust system is equipped with HEPA filters to minimize release of airborne radionuclides. Although continuous monitoring is not expected to be required, the stack will be designed to allow periodic confirmatory measurements of emissions.

2.2 NO-ACTION ALTERNATIVE

Under the no-action alternative, the proposed storage facilities would not be built. Current tank capacity at the MVST is about 500,000 gal. LLLW would continue to accumulate until storage capacity is reached (by the year 2000). Currently, the MVST are nearly filled (about 67,000 capacity remaining) (Sect. 1.2, DOE 1992a, DOE 1992d). When they reach capacity, ORNL waste-generating operations, ongoing research and development, and decontamination and clean-up activities would halt.

The LLLW treatment system and other treatment systems [process waste, nonradiological waste (NW), and gaseous waste (GW)] are all integrated and are subject to National Pollutant Discharge Elimination System (NPDES) permit requirements. If the treatment system or a portion of it were to shut down (as a result of lack of storage space and termination of LLLW generating operations), NPDES violations would occur on a daily basis because acceptable levels of contaminants would be exceeded in the effluent (see Sect. 2.3.1). Surface water releases exceeding NPDES permit concentration limits could affect the health and safety of the general public that uses the water resources located downstream from White Oak Dam (an NPDES-permitted discharge point for ORNL). In addition, noncompliance with the terms of the FFA could result in; (a) potential health and safety risks to workers and the public; (b) EPA and TDEC ordered shut-down of vital ORNL operations and programs; and (c) EPA-stipulated penalties against DOE of up to $10,000 per week.

2.3 ALTERNATIVES ELIMINATED FROM CONSIDERATION

The alternatives listed below are not evaluated in this EA because none would meet the FFA requirements for present and future collection and storage for LLLW at ORNL.

2.3.1 Cease Operation

LLLW generated at ORNL results from decontamination activities, nuclear research projects, and waste treatment. Therefore, stopping generation would require suspension or termination of these activities (ORNL 1993b) and ultimately shutting down all research activities.

Ceasing activities that generate LLLW would not, however, eliminate all LLLW generated at ORNL. Much of the liquid waste (process and low-level) that is collected and treated at ORNL results from passive generating sources, such as contaminated groundwater and leakage of rainwater into existing facilities that is then processed through the LLLW system. At this time, these sources of contaminated wastewater cannot be eliminated. If this contaminated water were not collected and treated, it would quickly add to contamination now present in the White Oak Creek watershed and could eventually contaminate public water supplies downstream from ORNL.

2.3.2 Storage at Other Existing ORR Storage Facilities

There are no other existing tanks on the ORR that provide ample shielding, monitorability, and storage capacity for the projected or estimated quantities (450,000 gal) of LLLW. The existing MVSTs provide approximately 500,000 gal of total capacity (ORNL 1992a) with 67,000 gal remaining. Other tank systems at ORNL are either at or near capacity.

2.3.3 Source Treatment of LLLW

Source treatment (i.e., treatment at the waste originator facility) would vary depending on the generation facility and the waste constituents. Source treatment of LLLW would generate solid waste forms that presently do not have a means of final disposal; and solid secondary wastes that cannot currently be handled by the ORNL solid low-level waste system. This is an alternative that is not, at this time, economically feasible and an option that could not meet storage requirements for LLLW required by the FFA (S. Robinson, Oak Ridge National Laboratory, Chemical Technology Division, personal communication to M. C. Wade, Oak Ridge National Laboratory, Oak Ridge, Tenn., April 20, 1993). Some additional capacity would also be required to store waste prior to treatment.

2.3.4 Pretreatment of LLLW at the Source

The pretreatment alternative would require LLLW pretreatment capability at each source of generation and would also require building a new LLLW treatment facility to produce segregated solid wastes. Examples of pretreatment include; (1) removal of Resource Conservation and Recovery Act (RCRA) wastes at REDC to eliminate mixed waste; (2) removal of transuranic waste at REDC to take the transuranic waste out of the LLLW system; and (3) substitution of sodium for potassium in off-gas scrubbing to eliminate potassium from the waste and make it easier to process 137Cs wastes (S. Robinson, Oak Ridge National Laboratory, Chemical Technology Division, personal communication to M. C. Wade, Oak Ridge National Laboratory, Oak Ridge, Tenn., April 20, 1993). The required building expense of the new facility and time constraints make this option prohibitive. Some additional capacity would also be required.

2.3.5 Storage at Other DOE Facilities

No other DOE facilities have been identified to accept the shipment of LLLW from ORNL. Furthermore, no mechanism has been developed to process and prepare the LLLW for shipment at ORNL if another DOE facility was identified.

This alternative would include removing and transporting LLLW to another DOE facility. This would cause much greater potential for risks to human health and the environment than for the liquid waste to remain in the closed LLLW system. This alternative, therefore, is not considered reasonable.

3. EXISTING ENVIRONMENT

3.1 PROPOSED PROJECT SITE

The proposed site is an existing cleared area set in a wooded site directly south of the existing MVST facility in Melton Valley at ORNL (Fig. 6). The footprint of the new storage tank facility would be approximately 240 × 240 ft, and approximately 1.5 acres would be regraded for construction. Access to the site is via Melton Branch Patrol Road.

3.1.1 Aquatic Resources

Landforms to the southeast of the proposed site rise steeply for 400 ft to the ridge crest. The proposed site is located on a small topographically high area at elevations ranging from 810 to 830 ft MSL. Water level monitoring data from well number 1217, located approximately 500 ft southwest of and in a similar topographic and geologic setting to the proposed site, indicate that the groundwater table in the vicinity of the site lies within 10 ft below the design grade for the facility (Lee and Ketelle 1989). No surface drainages, seeps or standing water are located on or near the site. The proposed route of the potable water pipeline intersects several small ephemeral drainages and crosses Melton Branch. Elevations along the route of the proposed potable water line range from approximately 770 to 820 ft.

Waters that drain the project site and proposed pipeline route flow overland into Melton Branch, which discharges into White Oak Creek and ultimately into the Clinch River downstream of Melton Hill Dam (Fig. 7). Base flow discharge in Melton Branch is typically low with periods of no flow, particularly during the summer (McMaster 1967; Loar 1988; Loar 1992).

Extensive studies of Melton Branch, conducted as part of the ORNL Biological Monitoring and Abatement Program (BMAP), include instream ecological monitoring, studies of the periphyton communities, toxicity testing, radioecological studies, and bioaccumulation of nonradiological contaminants. Results of the 1986 through 1990 studies were reported in a series of annual reports by Loar et al. (1987, 1988, 1989, 1990 and 1991).

In Melton Branch, there is sufficient flow during the non-summer months to allow the establishment of a relatively diverse benthic macroinvertebrate community and a small fish community (Ryon 1988 and Smith 1988a, 1988b). A weir on Melton Branch upstream of mile 1.3 serves as a (Figure 7 Surface water drainage patterns of Melton Valley) barrier to movement of fish upstream. Fish survey reports for 1990 showed only creek chubs and blacknose dace in the uppermost Melton Branch sampling sites miles 0.86 and 1.30. Samples in lower Melton Branch mile 0.4 above its confluence with White Oak Creek contained creek chubs, blacknose dace, and redbreast sunfish (Loar 1991). The densities and standing crops of fish in lower Melton Branch are comparable to values from other small headwater streams in the area (Loar 1991).

Most of the benthic taxa occurring in the upper portion of Melton Branch and in the MVST and SWSA (solid waste storage area) 7 vicinity are typical of moderately disturbed and relatively undisturbed streams, respectively, on the DOE Oak Ridge Reservation (Smith 1988a, 1988b). The relative abundance and biomass of disturbance-intolerant species of benthic insects [Plecoptera (stoneflies) and Ephemeroptera (mayflies)] in upper Melton Branch mile 1.3 were greater than the composition of the downstream sampling sites miles 0.75 and 0.37 (Smith 1992).

3.1.2 Terrestrial Resources

Vegetation in the vicinity of project site is a mixture of pine and hardwoods on the slope adjacent to Melton Valley Circle and adjacent to the existing MVST area. This forest is typical of abandoned, eroded farmland on the ORR. Further upslope from the existing MVST site, vegetation is mixed hardwood, primarily oak-hickory, and is typical of undisturbed wooded sites on the ORR. The proposed site, however, has been heavily disturbed and current vegetation cover is primarily grass and weeds. The proposed water line right-of-way intersects the following forest communities: (1) pine-hardwoods near the project site and parallel to Melton Valley Circle, (2) riparian woodlands adjacent to Melton Branch Creek, and (3) highly disturbed mixed hardwoods and pine-hardwoods near the connection with the existing pipeline (Cook 1992). Wildlife at the project site and along the pipeline right-of-way is typical of wildlife found on the ORR and Melton Valley.

The proposed site was checked for the presence or absence of wetlands in accordance with the 1987 Army Corps of Engineers definitions (USACOE 1987) and the 1989 interagency definitions (Federal Interagency Committee for Wetland Delineation 1989). Neither the project site nor the right-of-way contain wetlands (Rosensteel 1992a, 1992b, 1992c, 1992d, Appendix B). The pipeline, however would cross floodplains along Melton Branch Creek (Cook 1992, Rosensteel 1992a). Permits would be required for the water pipeline crossing of Melton Branch. These include an Aquatic Resource Alteration Permit from the Tennessee Department of Environment and Conservation, Division of Water Pollution Control (Tennessee Water Quality Act, Tennessee Code Annotated 69 ETSEQ, TDEC Chapter 1200-4-7.08).

Surveys have not found federally listed, federal candidate, or state listed plant or animal species or sensitive habitats on the Project site or the pipeline right-of-way (Cook 1992, Rosensteel 1992a, 1992c, 1992d; Appendix B).

An archaeological survey of the subject tract of land has identified the Jones House site, which is considered eligible for inclusion in the National Register of Historic Places pursuant to 36 CFR Pt. 60.4(d). This House is located approximately 400 ft northeast of the proposed project site (Fig. 6). No other archaeological sites or cultural material were identified on the project property (DuVall and Associates 1992). Consultation with the State Historic Preservation Officer (SHPO) is included in Appendix C.

3.2 ANNUAL RADIATION DOSE

3.2.1 Background

The average annual radiological effective dose equivalent (EDE) to an individual residing in the United States is approximately 360 mrem/year (NCRP 1987). The sources and approximate doses of this total exposure are as follows:

·	Radon and its progeny Other natural sources Medical exposures Consumer products Other sources	200 mrem/year 100 mrem/year 50 mrem/year 9 mrem/year 1 mrem/year	·
·	Total	360 mrem/year.	·

According to Kornegay et al. (1991), a typical annual, 50-year committed EDE to a hypothetical maximally exposed individual due to direct radiation from ORNL is about 6 mrem, which is about 1.7% of the EDE to the average U.S. resident due to natural and other sources of radiation. The 1990 50-year committed EDE from ORNL waterborne discharges to an individual drinking water from the nearest public water supply was 0.04 mrem. The maximum exposure expected from eating contaminated fish in 1990 was 0.3 mrem. It is expected that the nearest population (Kingston, Tennessee) would receive an annual collective committed EDE of about 0.7 person-rem from drinking water and eating fish. This represents about 0.03% of the annual dose from background radiation (2250 person-rem) to this population (Kornegay 1991). A conversion factor of 5 × 10¾4 rem¾1 for the public can be used to estimate cancer fatality risks from radiation doses (ICRP 1991, NAS 1990). This factor is most appropriately applied to population exposures in the 0.1 to 10 rem range. Therefore, the 0.7 person-rem committed EDE for the population of Kingston, Tennessee would be statistically associated with a 3.5 × 10¾4 cancer fatality risk. The background radiation dose of 2250 person-rem to this population would be statistically associated with about one cancer fatality due to radiation exposure. Note that a factor of 4 × 10¾4 rem¾1 is used for occupational exposures (ICRP 1991). These conversion factors are not applied to the low (mrem) individual exposures in the following sections of this document due to the uncertainties associated with such extrapolations.

3.2.2 Occupational Radiation Dose

The annual average EDE to all types of radiation workers in the United States (e.g., medicine, industry, nuclear fuel cycle, government, etc.) is approximately 220 mrem/year (NCRP 1987). At ORNL, the Liquid and Gaseous Waste Operations Department (LGWOD) of the Waste Management and Remedial Action Division (WMRAD) would be responsible for operation of the proposed facility, among many other activities. Ten out of the 37 LGWOD workers in 1991 had measurable exposures with an average penetrating dose (from gamma radiation) of 8 mrem and an average dose to the skin (from beta radiation) of 14 mrem. The maximum exposures were 85 mrem and 103 mrem for penetrating dose and dose to the skin, respectively (ORNL 1992b). Exposures from MVST operations cannot be separated from the overall LGWOD exposures because workers are involved in several other activities.

In addition to LGWOD workers, work crews from ORNL's Plant and Equipment (P&E) Division are assigned to support the LGWOD on a rotating basis. Twenty-eight out of 41 individuals were exposed in 1991 and the average EDE for all 41 persons was 8.5 mrem. The maximum exposure was 52 mrem. The Instrumentation and Controls (I&C) Division and the Health Physics Division also provide support to the LGWOD. All 10 I&C personnel that support LGWOD were exposed in 1991 with an average exposure of 28.9 mrem and 5 out of 10 Health Physics support personnel were exposed with an average exposure of 8.1 mrem. The maximum I&C exposure was 73 mrem and the maximum Health Physics exposure was 38 mrem (ORNL 1992b). However, when P&E and I&C personnel are not assigned to the waste operations group they work within other areas of ORNL and are subject to radiation exposure at those areas; therefore, their average doses are not received solely from waste management operations.

It should be noted that doses to ORNL workers are all significantly lower than the DOE limit of 5 rem/year (5000 mrem/year). DOE Order 5480.11, "Radiation Protection for Occupational Workers," establishes radiation protection standards and program requirements for DOE and DOE contractor operations with respect to the protection of workers from ionizing radiation. DOE's limiting value for a worker's radiation dose is 5 rem/year (annual EDE) from both internal and external sources received in any year for the whole body. DOE also has a policy that requires exposures to be as low as reasonably achievable (ALARA). ORNL's 1993 ALARA goal is to keep individual occupational exposures below 0.75 rem/year. Permission from an ORNL division director is required if exposure is to exceed 0.75 rem/year. ORNL's more aggressive "absolute" ALARA goal is 1.0 rem/year, requiring permission from the Energy Systems President to exceed this level.

4. ENVIRONMENTAL CONSEQUENCES

This section evaluates impacts that would result from the construction and operation of additional storage capacity at the MVST facility and its related supporting activities. This section also evaluates the cumulative impacts of other nearby proposed sites in the Melton Valley area. The following issues have been identified as having a potential for environmental impacts as a result of constructing and operating LLLW storage facilities: air quality, groundwater, surface water, terrestrial and aquatic ecology, and health and safety. Due to the very small workforce being affected by this proposed site, socioeconomic impacts are assumed to be negligible and are not assessed in this section. In addition, noises created at and by the facility would not be expected to be noticeable. Noise impacts to people off the site would be negligible as the facility would be flanked by ridges and the nearest potentially affected receptor is approximately 1.9 miles to the southeast.

DOE is preparing a Programmatic Environmental Restoration and Waste Management EIS (55 *Federal Register* 42637–38) for DOE-wide waste management activities. The proposed action in this EA would provide additional permitted storage for LLLW and continuation of ORNL waste management operations until treatment and disposal methods for these wastes are evaluated in the programmatic EIS and decisions are made on the ultimate fate of the wastes.

4.1 CONSTRUCTION

4.1.1 Groundwater

As mentioned in Section 3.1, water level monitoring data in the vicinity of the proposed site, indicate that the groundwater table lies within 10 ft below the design grade for the facility (Lee and Ketelle 1989). If construction were undertaken during the winter and spring months when water tables tend to be elevated, groundwater seepage into the working area could occur. Seepage water volumes would be small because of the relatively low permeability of site soils. Seepage water control would require maintenance of grade slopes to areas where gravity drainage would carry the water to the ephemeral drainage channel to the east of the site (Fig. 6). Accidental spills of construction liquids might cause minor contamination of localized areas of soil. Rapid spill emergency response would minimize impacts to groundwater. Any soil contaminated by a spill would be collected and disposed of at appropriate ORNL waste disposal facilities in accordance with the *ORNL Spill Prevention, Control, Countermeasures and Contingency Plan* (September 1985). The design of the facility will include drainage piping below and around the perimeter of the vault structure to minimize the potential for groundwater inleakage into the vault during construction and operation (Sect. 2.1.1).

Portions of the trench for the potable water pipeline could be below the groundwater table. During construction activities, this water would have to be pumped out of the trench, resulting in a temporary localized lowering of the groundwater table.

4.1.2 Surface Water

Excavation and regrading of 1.5 acres for the proposed tank facility and construction of the truck unloading facility, buildings, and fences could result in soil erosion and subsequent sedimentation in nearby bodies of water (Melton Branch, White Oak Creek, and perhaps White Oak Lake); however, properly constructed barriers such as silt fences, should minimize impacts. During dry conditions no adverse effects on surface water quality are anticipated because standard erosion control practices would be utilized. Under conditions of unusually wet weather, unanticipated influxes of runoff into construction areas could result in temporarily heavy erosion and sediment transport in the ephemeral drainage to the east of the site or in the ephemeral drainages intersecting the proposed pipeline route. Adverse impacts to perennial streams would not be expected.

An elevated pipeline would be used to cross the stream so that there would be no construction through the stream channel; however, sedimentation could occur from construction in the immediate vicinity of the stream. In order to minimize impacts to the stream, construction equipment would use nearby existing roads to access the pipeline route on either side of the stream and construction in the immediate vicinity of the stream would be done to minimize the potential for sediment transport. Such actions including but not limited to erosion fences or hay bales, for sediment retention would minimize potential impacts to adjacent surface waters and aquatic biota. In addition, construction would conform with requirements of the Tennessee Water Quality Control Act [TWCA 69-3-108(b)] which requires a permit before any "alteration of the physical, chemical, radiological, biological, or bacteriological properties of any waters of the state" could occur.

4.1.3 Floodplain Assessment (Water Line Crossing)

The proposed action includes the construction of a water line which will cross the 100-year floodplain of Melton Branch (Cook 1992, Rosensteel 1992a, Appendix B). In accordance with 10 CFR 1022 a Notice of Floodplain/Wetlands Involvement was published in the *Federal Register* on October 4, 1993 (see Appendix D) and the following assessment was completed.

The pipeline route (from the 16-inch tie in at HFIR to the proposed site) and the floodplain crossing are shown on Fig. 8 (Fig. 8. Water pipeline route and Melton Branch Crossing). The pipeline crossing over Melton Branch would be elevated. The concrete footers (i.e., supports) for the pipeline will be located in the existing gravel roadbed (Melton Branch Circle) which crosses Melton Branch. It is expected that 3 footers would be required within the 120 ft distance that the road currently occupies within the floodplain. Because each footer is expected to displace less than 60 cubic feet of soil, it is estimated that a total of less than 180 cubic feet of soil would be displaced for the pipeline crossing. This would result in the potential for only minor erosion and sediment transport into Melton Branch.

As discussed in Sect. 3.1.2, the proposed site, including the pipeline route, was checked for the presence or absence of wetlands. The proposed pipeline right-of-way did not contain wetlands (Rosensteel 1992a; 1992b, 1992c, 1992d, Appendix B). Surveys have not found federally listed, federal candidate, or state listed plant or animal species or sensitive habitats on the pipeline right-of-way (Cook 1992, Rosensteel 1992a, 1992c, 1992d, Appendix B).

Since there are no wetlands, endangered species, or threatened species within the floodplain area, and the pipeline crossing is to be elevated and within an existing roadbed, only minor short-term impacts would be possible as a result of the construction of the pipeline. In addition, best management practices would be strictly implemented during construction to avoid erosion, siltation, and other indirect impacts to Melton Branch (Sect. 2.1.10).

The only other alternative to the proposed pipeline would be no action. This alternative would not provide the potable water service needed for the proposed MVST-CIP facility. The proposed pipeline route is the best way to minimize environmental impacts since it would follow a previously disturbed gravel roadbed. Any other crossing along the route would require more disturbance within the Melton Branch floodplain.

4.1.4 Aquatic Ecology

Impacts, specifically sedimentation, to aquatic biota in upper Melton Branch as a result of clearing and construction at the project site and along the pipeline route would be minimized by sediment fences and other measures to prevent sediment and any stored hazardous materials (e.g., fuels) from being carried by runoff from the site. Measures to minimize the overall impacts on aquatic resources in Melton Branch from construction of the expanded site and the pipeline would protect both the diversity and density of benthic invertebrates in the upstream reaches of Melton Branch.

4.1.5 Terrestrial Ecology

About 2 acres of mixed hardwood-pine forest would be disturbed by the pipeline construction and an additional 1.5 acres would be regraded for the project. Most of the project site is currently nonforested. Because the total area that would be affected is small, its clearance should have little impact on the terrestrial ecology of the region. This cleared area would represent less than 0.04% of the roughly 9,000 acres of pine forest and 14,300 acres of hardwood forest remaining on the ORR. The loss of forest habitat would result in a correspondingly small reduction in populations of forest dwelling wildlife on the site.

Leveling the site would create some opportunity for erosion on the exposed slopes. These areas would be planted with vegetation to stabilize the soil surface, using native species, as outlined in Executive Order 11987 (Exotic Organisms) DOE-5400.1/AI-1, which restrict the introduction of exotic species into natural ecosystems on federally owned land.

4.1.6 Health and Safety

Radiation or contamination problems would not be anticipated during the construction of the proposed facility. All activities would be conducted in full accordance with ORNL, Martin Marietta Energy Systems, Inc., and DOE policies regarding protection of personnel and the environment. This includes procedures in the *ORNL Environmental Protection Manual*, the *ORNL Safety Manual*, the *ORNL Health Physics Procedures Manual*, and the *ORNL Industrial Hygiene Manual*. Health Physics and Industrial Hygiene personnel would monitor the site during any excavation activity in accordance with ORNL/M-116/R1, *Health, Safety and Environmental Protection Procedure for Excavating Operations*. In addition, all activities would be conducted in accordance with ALARA objectives (DOE Order 5480.11). All materials removed from the construction site, such as wastes, would be contained and checked for radioactivity and handled and disposed of commensurate with the content of the waste. To avoid exposure from potential spills of liquids, including hydraulic fluid, lubricating oil, fuels, and ethylene glycol during construction (e.g., if construction equipment overturned), construction personnel would be trained in accordance with ORNL's spill prevention control countermeasures and contingency plans (Eisenhower et al. 1985).

Occupational hazards associated with construction of the facility would be considered standard industrial hazards. Such hazards are defined as meeting one of the following criteria: (1) routinely encountered or accepted by the public in everyday life; (2) encountered in general industry and significantly affecting a large number of people; or (3) encountered in general industry and controlled through the application of recognized codes and safety standards [e.g., Occupational Safety and Health Administration (OSHA) standards]. Workers would comply with the applicable DOE Order 5480.9, "Construction Safety and Health Program" and all applicable OSHA provisions.

4.1.7 Air Quality

A screening model was run for construction at the proposed site under worst-case meteorological conditions, with the wind blowing across flat terrain in the direction of the nearest residence. Results indicate that the annual average PM-10 (particulate matter—10 µm in diameter) would be 25 µg/m3 (which includes a background value of 20 µg/m3). This is well below the NAAQS of 50 µg/m3, therefore, effects of the proposed site would not be expected to lead to any exceedances of NAAQS.

4.1.8 Historic Resources

The project would have no effect on any property included in or eligible for inclusion in the *National Register of Historic Places* pursuant to 36 CFR Pt. 60.4(d). The Jones house, which is considered eligible for inclusion, would not be impacted by the proposed site because it is located approximately 400 ft to the northeast of the site and will not be within the area disturbed by construction equipment. National Historic Preservation Act, Sect. 106 consultation with the SHPO has confirmed these findings.

4.1.9 Environmental Justice

Executive Order 12898 requires federal agencies to achieve environmental justice "to the greatest extent practicable" by identifying and addressing "disproportionately high and adverse human health or environmental effects of its ... activities on minority populations and low-income populations...." For the proposed action and other alternatives considered in this EA, the effects identified would not disproportionately affect any minority group or low-income group. The proposed action is an expansion of an existing LLLW system (MVST facility) which is located entirely on federal land. Selection of the proposed site was primarily based on the proximity to the existing MVST Facility. The MVST facility is not located near low-income or minority neighborhoods and, therefore, there is no unequal distribution of costs of income or minority groups.

4.2 OPERATION

4.2.1 Groundwater

Under normal conditions impacts are not anticipated on groundwater. Under conditions of unusually wet weather, groundwater seepage might occur as described in Sect. 4.1.1. Adequate maintenance of drainage and seepage control structures (e.g. storm water ditches and perforated PVC pipes around the tank building) would be required to divert moisture or water flows around the project facilities (Sect. 2.1.1). Containment features incorporated into the design of the tank vault, control and equipment building, and truck station (e.g. sloped floors, dikes, and lined and monitored sumps) would minimize the potential for movement of contaminants from these facilities into groundwater. Material used in backfilling of the potable water pipeline trench could be more permeable than native soils, creating a preferred pathway for groundwater movement.

4.2.2 Aquatic Resources

When construction of the storage facilities and potable water pipeline and subsequent soil stabilization are completed, there should be minimal potential for impacts from runoff and sediment transport from the site. Adequate maintenance of drainage control structures at the project site would be required to divert moisture or water flows around the facilities. Containment features (e.g. sloped floors, dikes, and lined and monitored sumps) incorporated into the design of the facilities would minimize the potential for movement of contaminants into surface waters. Adverse impacts on surface water quality would not be expected from operation of the potable water pipeline.

The proposed storage tanks would be fully contained and enclosed, thereby minimizing the possibilities of LLLW coming in contact with surface waters. The location of the tanks would also minimize the potential for impacts to surface waters from an accidental spill. The LLLW materials would be contained on the project site in single walled tanks surrounded by secondary containment, which allow for sampling to determine potential leakage. Any leakage from the storage tanks would be identified and contained by the double-walled construction before it could reach the ground surface, surface water, or groundwater.

The design (e.g. sloped floors, dikes, and lined and monitored sumps) of the extended storage tank facility should prevent leakage or runoff from the site. Therefore, no impacts on aquatic biota from operation of the proposed site facility are anticipated.

4.2.3 Terrestrial Ecology

Operation of the proposed site would not impact terrestrial resources since the project site is already cleared.

4.2.4 Health and Safety

Adverse health effects associated with the harmful materials at the proposed facility can only occur if there is exposure to these materials. During incident-free operation, human exposures would be unlikely. LLLW would be transferred in double-walled, underground pipelines to the proposed MVSTs. The storage facility would be controlled and monitored in a separate concrete block building. The tanks would also be sampled manually using a grab-sample device that is totally contained within a glove box shielded enclosure (Sect. 2.1.8). Therefore, no direct contact with the waste would be expected. Sampling of the waste in the tanks would be conducted about every two years. HNO3 and NaOH, chemicals used to adjust pH of the tanks, would be transported by tanker truck to the truck station and pumped directly into the storage tanks, if required. At the existing MVSTs, there have been no exposures from routine operation of the tanks (see Sect. 3.2.2 for additional data on exposures from all waste operations workers). Furthermore, because no HNO3 or NaOH has been added to the existing MVSTs in the past, there have been no exposures to these chemicals from past MVST operations (C. Scott, ORNL, Liquid and Gas Waste Operations Department, personal communication with M. L. Socolof, ORNL, Energy Division, June 22, 1994). No exposures would be expected during normal operations of the proposed facility.

The LLLW concentrate that would be stored in the new storage tanks would contain special nuclear material (e.g., fissionable materials), radiation, and toxic constituents (see below). Special nuclear material can result in an accidental nuclear criticality if the quantities are sufficient and certain conditions are met (e.g., moderation, reflection). However, the Safety Assessment (Green and Platfoot 1992) has determined that a nuclear criticality at the proposed site is not credible.

The radiation sources in the form of alpha-, beta-, and gamma-emitting radionuclides in the LLLW concentrate could have the potential to result in external and internal radiation exposures to on-site and off-site individuals. Based on the maximum levels of radiation to be accepted at the storage tanks, the maximum activity would be the ingestion dose equivalent of 2 Ci/gal of 90Sr (Snow 1993). However, radiation hazards to humans are only of concern if there is exposure. Because the storage tanks would fully contain the LLLW concentrate, direct human exposure would not be of concern.

Accidents could cause the release of LLLW and possibly the exposure of on-site or off-site individuals. A break in the double-walled underground pipeline would not be expected to result in human exposure because, in order to minimize accidental spills of LLLW, the system would be designed to shut down upon detection of a leak. Furthermore, a release from any credible accident that would cause a tank to rupture would be contained by the lined secondary containment structure. The released liquid would be processed back into the LLLW system. There have been no accidents at the existing MVSTs (C. Scott, ORNL, Liquid and Gas Waste Operations Department, personal communication with M. L. Socolof, ORNL, Energy Division, June 22, 1994).

Two other chemicals to which individuals might be exposed during operation of the proposed facility are HNO3 (acid) and NaOH (caustic). If the pH (acidity) of the tank needs adjustment, a tanker truck would transport the chemical to the truck station at the proposed facility. The chemical would then be transferred directly into the tanks. The tanker truck holds two tanks, one for the acid and one for the caustic chemical. The acid tank holds approximately 500 gal of

HNO3 and the caustic tank holds approximately 300 gal of NaOH. Only one chemical would be transported at a time. The amounts of these chemicals required for operation of the storage tanks are unknown as the chemicals would only be needed if the pH were not sufficiently adjusted upstream in the collection system. Therefore, the frequency of potential chemical delivery trips is unknown but expected to be infrequent.

A truck accident involving the transport of HNO3 or NaOH could cause the release of a large quantity of these chemicals that could be immediately dangerous to life and health if inhaled as vapor (HNO3) or dust or mist (NaOH). Such an accident would be of low probability and could result in acute exposure either through inhalation or direct contact. HNO3 is volatile and inhalation of vapors could cause severe nose and throat irritation with delayed fever, cyanosis and pulmonary edema, cough, breathing difficulty, and bronchopneumonia. Upon skin contact, HNO3 produces immediate chemical burns. Exposure to concentrated aqueous solutions would cause early sensation of pain and painful ulcers. As a liquid or vapor, HNO3 could also cause severe eye irritation, chemical burns, and permanent visual defects or blindness (MMES 1992). NaOH is also toxic and can cause irritation to eyes, respiratory system, skin, and lungs; and it is corrosive to body tissues (Sittig 1985). Adverse effects would require that an individual be in direct or close contact with the spill before it dispersed to nontoxic levels; therefore, the truck driver or anyone assisting him or in the immediate vicinity of the release could be exposed. Because no HNO3 or NaOH has been added to the existing MVSTs in the past, there have been no associated accidents at the MVSTs. However, tanks of these chemicals are frequently used at ORNL in other applications and there have been no accidents associated with the transfer of these chemicals at ORNL (C. Scott, ORNL, Liquid and Gas Waste Operations Department, personal communication with M. L. Socolof, ORNL, Energy Division, June 22, 1994).

4.2.5 Air Quality

Adverse air quality impacts are not expected from operation due to anticipated negligible releases and realizing the facility will include HEPA filters (see Sect. 2.1.9).

4.3 CUMULATIVE IMPACTS

DOE has proposed the construction and operation of other waste management activities in Melton Valley (Fig. 9. Locations of Oak Ridge National Laboratory's proposed waste management projects for Melton Valley through 1995) through 1995. NEPA documentation is being prepared for each of these proposed sites. The cumulative impacts from the implementation of these proposed actions in Melton Valley are assessed in this section. Cumulative impacts from these facilities are in addition to ongoing ORNL operations. All assessments are currently in preparation except for the EA for receipt and storage of waste from NFS (DOE 1992c), which has been completed and for which DOE has issued a finding of no significant impact (FONSI).

- **Contact-handled and remote-handled transuranic waste storage buildings** (sites 3 and 8 on Fig. 9). Two CH-transuranic waste storage facilities and one CH-transuranic waste staging and storage facility are proposed to be constructed and operated in Melton Valley. These metal buildings would store CH-transuranic and mixed CH-transuranic waste. Approximately 3 acres would be cleared and leveled for this project. The proposed RH-transuranic waste storage facility would consist of one reinforced concrete bunker to store casks of RH-transuranic and RH-transuranic mixed waste generated at ORNL. The building would be in Melton Valley, and approximately 1 acre would be cleared. All transuranic waste facilities would be permitted under the RCRA.
- **Class III/IV Solid Low-Level Waste (SLLW) Storage Facilities** (sites 1 and 2 on Fig. 9). These proposed facilities would consist of four below-grade and one above-grade SLLW storage facilities to be constructed and operated in Melton Valley. Construction of these facilities would result in clearing approximately 13 acres (4 acres for the above-grade facility and 9 acres for the four below-grade facilities). Construction and operation of the below-grade facilities would occur consecutively as required over approximately 10 years.
- **NFS CH-transuranic Waste Storage Building** (site 4 on Fig. 9). A metal building is proposed to store mixed

waste being transported from the NFS facility in Erwin, Tennessee. This facility would be located in Melton Valley. Approximately 3 acres would be cleared (DOE 1992c).

- **Bulk Contaminated Soils Storage Building** (site 5 on Fig. 9). A metal building is proposed to be built in Melton Valley to store radioactively contaminated soils excavated at ORNL. Approximately 1 acre would be cleared.
- **Melton Valley Low-Level Waste Collection and Transfer System** (site 7 on Fig. 9). This project proposes to replaces existing underground LLLW transfer lines from the Radiochemical Engineering Center in Melton Valley to existing waste lines in the main ORNL complex, located in Bethel Valley. The project also includes the proposed construction of a monitoring and control station for collection of LLLW from Melton Valley facilities and the addition of an ion exchange system in the HFIR building for treatment of HFIR waste. Dewatered and dried spent ion exchange resins (Class II SLLW) would be stored as part of the Class III/IV above-grade inventory. Approximately 4 acres of land would be disturbed by construction associated with the upgrade.
- **LLLW Solidification Project Interim Storage Pad** (site 6 on Fig. 9). This project would involve constructing and operating a gravel storage pad to store concrete casks of solidified LLLW. The proposed site is located adjacent to Melton Valley. Approximately 4.2 acres of land would be cleared.

Other Melton Valley waste management projects under consideration, but not included in this cumulative impact assessment, are listed below. These projects are in the early stages of planning. Additional analysis of cumulative impacts will be completed as the NEPA documentation for these projects is prepared.

- **Mixed Waste Storage Facilities** (site 10 on Fig. 9). These facilities will be proposed to expand the storage capacity of hazardous mixed waste storage facilities located in Melton Valley. Approximately 0.25 acre of land would be affected by construction of proposed buildings.
- **Waste Characterization and Certification Facility** (site 11 on Fig. 9). This project is now on hold and is expected to be expanded to a central ORR verification facility. A possible site for this facility is in Melton Valley near the site of the proposed CH-transuranic and NFS storage facilities. This facility would replace the Waste Examination and Assay Facility for the characterization of CH-transuranic waste and SLLW. The amount of land to be disturbed by this project has not been determined at this time.

Approximately 33 acres of land would be cleared for all proposed projects through 1995. Operation of these facilities would result in the transport and storage of low-level, TRU, and mixed wastes at ORNL. Releases of hazardous material or radioactive isotopes from storage facilities would not be expected under normal operation. The cumulative impacts of these reasonably foreseeable actions are discussed in the following paragraphs.

4.3.1 Groundwater

Construction and implementation of the proposed sites in Melton Valley would be expected to have minimal cumulative impacts on groundwater hydrology and quality. Implementation of groundwater suppression techniques at individual sites could have minimal localized effects on the groundwater table. Lowering of the water table by approximately 1 ft could occur over small areas. Materials used in the backfilling of pipeline trenches could be more permeable than native soils, creating preferred pathways for groundwater movement. Containment features incorporated into the design of the facilities would minimize the potential for movement of contaminants from these facilities into groundwater. During construction, accidental releases of construction liquids could occur. However, rapid spill emergency response would minimize impacts to groundwater.

4.3.2 Surface Water

Construction of the proposed storage tanks, in addition to the other Melton Valley proposed sites included in this cumulative assessment, would result in clearing and grading additional lands totaling to 33 acres and potential sediment mobilization and transport into nearby surface waters. The potential for eroded material to reach the stream and have an adverse impact on water quality increases as more area in the watershed is disturbed. However, the impact to surface water is expected to be minimal because (1) most of the other proposed facilities are remote from the construction site, (2) many of the streams in the construction areas are intermittent during part of the year, (3) only a portion of the total area would be under construction at any one time, and (4) best management practices (i.e., hay bales and silt fences) would be implemented to reduce impacts. Further, the BMAP, which surveys water quality in Melton Valley and has shown improvement in water quality in the last few years, will continue to monitor water quality in Melton Valley.

Operation of numerous production and storage facilities in Melton Valley increases the potential for accidental releases of contaminants and potential transport of these contaminants into the aquatic environment. However, clean up of any spill of hazardous materials would minimize the potential for impacts to surface waters.

4.3.3 Wetlands

The proposed facilities in Melton Valley are not anticipated to have separate or cumulative adverse effects on wetlands. Wetland surveys have been conducted for each proposed site. While, wetlands do occur near some of the proposed sites, all wetlands would be delineated prior to construction to ensure their protection. In addition, coordination with the Army Corp of Engineers as well as the state of Tennessee would be completed as appropriate.

4.3.4 Aquatic Ecology

The effects of sedimentation in small streams are generally additive and result in habitat degradation or loss and ultimately in changes in community composition of the aquatic environment. Disturbance of only a small portion of the overall area at any one time by construction activities, in addition to use of best management practices during construction and operation at all sites, would minimize impacts to surface water quality and, consequently, to aquatic biota. As more land in the watershed is disturbed, the potential for eroded material to reach the stream, to accumulate, and to have an adverse impact on aquatic biota increases. The BMAP surveys have shown an increase in fish and macroinvertebrate populations in Melton Branch in the last few years. Without adequate planning and control measures, this trend could be reversed by increased sedimentation and habitat alteration. Employment of best management practices and disturbing only a small portion of the overall area at any one time would prevent impacts from becoming significant.

4.3.5 Terrestrial Ecology

Construction and the resulting alteration of habitat poses the largest potential for impacts to terrestrial ecosystems locally and regionally. Construction and operation of each facility in Melton Valley would result in a loss of native forest habitat and associated wildlife. These effects are generally additive. Forest fragmentation affects some wildlife species (e.g., the ovenbird, which requires large areas of undisturbed forest), but not others. In general, as forest cover is removed from more areas within Melton Valley, smaller populations of species that require large forested areas would occupy the surrounding forest. Other species, however, which use openings and edges of forests, would increase in abundance. These species already occupy abundant habitat associated with existing disturbed sites. Some species that require forested areas, especially neotropical migratory warblers, could be adversely affected by increased predation and parasitism from species that live in openings and edges and hunt in surrounding forest. The overall impact on the wildlife of ORR and the surrounding region would be relatively small because the entire acreage of the proposed sites is approximately 33 acres. About 85% of the land is forested on approximately 2000 acres of Melton Valley between Highway 95 and the eastern boundary of Melton Valley. Construction for these proposed sites would, therefore, result in less than an additional 1% of cleared forest in this part of Melton Valley. However, ORR is a uniquely large and continuously forested area in comparison to the surrounding landscape, and progressive fragmentation of forest on ORR could have a disproportionately negative effect on interior forest populations and migratory bird species in the region. Minimizing clearing of hardwoods during construction would help reduce forest fragmentation and help prevent surface runoff.

Site clearing would create some opportunity for erosion. These areas would need to be planted with vegetation to stabilize soil erosion using native species outlined in Executive Order 11987, "Exotic Organisms," and DOE Order 5400.1/AI-1, which restricts the introduction of exotic species into natural ecosystems on federally owned land.

The wetland and floodplain areas where the state-listed endangered lilies are growing in Melton Valley would be protected from disturbance, runoff, and siltation. The lily could be indirectly affected if there were changes in hydrology. The proposed sites in Melton Valley are not anticipated to have separate or cumulative adverse effects on wetlands or the listed lily populations. Other listed plants known to occur in Melton Valley would not be affected by this or other projects.

The cumulative impacts of construction and operation of each of these proposed facilities in Melton Valley to red-shouldered hawks that currently nest in Melton Valley are unknown. A 656 ft (200 m) buffer around the nest site may provide adequate protection. This species commonly nests close to roads, so traffic is not expected to be disruptive; however, continued disturbance and fragmentation of the existing forest with openings containing paved surfaces and facilities could eventually result in unsuitable habitat for nesting. Cumulative effects on other state-listed wildlife populations are assumed to be additive. Appendix A summarizes compliance with the Endangered Species Act of 1973.

The impacts of the proposed site would make a minor contribution to the cumulative impacts of all recent (i.e., last 10 years), currently proposed, and possible future DOE actions on ORR. DOE's past, current, and future actions, including property sales and numerous construction projects in various areas on ORR, individually have had insignificant impacts because each action by itself affects only a relatively small acreage. In total, however, such actions have considerable cumulative impact on ORR vegetation and wildlife. These impacts include loss of natural vegetation and reductions in wildlife populations as a result of habitat loss and forest fragmentation.

4.3.6 Air Quality

Because the background air quality of the region is good and because construction impacts would be minor, localized, and temporary, no significant cumulative impacts on air quality would be expected. Fugitive dust from construction of the proposed facility and eight other storage facilities has been modeled under the assumptions that no dust suppression measures (e.g., sprinkling with water) would ever be used and that construction would occur at all nine sites simultaneously under worst-case meteorological conditions with the wind blowing across flat terrain in the exact direction of the nearest residence (DOE/EA-0349). Results from a screening model incorporating the above assumptions indicated that the annual average PM-10 concentration at the nearest residential area (Shoreline Estates, in Knox County) could exceed the National Ambient Air Quality Standard (50 µg/m3) by a few percent (i.e., modeled concentrations as high as 51 µg/m3 were simulated in the nearest portions of the subdivision). This includes a background value of 31 µg/m3 and a modeled contribution from construction of 20 µg/m3. No exceedances of the 24-hour average PM-10 standard were simulated. Sprinkling would be used as a mitigative measure, if necessary, to reduce fugitive dust.

The conservative nature of the screening model and of the assumptions incorporated therein lead to appreciable overestimates of air quality impacts. Therefore, cumulative effects of the proposed site and simultaneous construction activities would not be expected to lead to any exceedances of NAAQS.

4.3.7 Archaeological Resources/Historical Sites

Archaeological and historical surveys have been or will be completed for the proposed facility sites in Melton Valley. The only currently known historical sites in Melton Valley include the Jones and Jenkins house sites (DuVall 1992). All proposed projects would conduct National Historic Preservation Act, Sect. 106 consultation with the SHPO. Recommendations received from the SHPO would be followed to ensure adherence to proper measures to protect archeological resources during construction and operation of facilities. No construction would begin at any site until Sect. 106 consultation had been completed.

4.3.8 Health and Safety

The construction and operation of proposed facilities in Melton Valley could result in additional injuries, illnesses, or radiation exposures. Injuries from construction and operation equipment are considered to be standard industrial accidents. Workers would comply with OSHA regulations (29 CFR 1926) and ORNL safety provisions to mitigate the incidence of equipment-related injuries or illnesses.

The proposed waste storage facilities in Melton Valley (Fig. 9) would represent an increase in the radioactive waste management activities at ORNL. However, waste operators at ORNL would continue to rotate between jobs, comply with DOE Order 5480.11, and make every effort to meet ALARA goals. Precise changes in exposures due to all the proposed sites are difficult to estimate. The annual dose to waste operations radiation workers would not be expected to vary much from the 1991 average measurable exposure of 40 mrem/year. This dose is well below the DOE limit of 5 rem/year and the ORNL ALARA goals of 0.75 rem/year and 1.0 rem/year. Therefore, no increased radiological risk to workers would be expected, and the cumulative impacts on worker health and safety during incident-free operation of this action would be negligible.

Some of the proposed facilities would handle mixed waste, thereby potentially exposing workers to hazardous materials. These facilities would only handle small amounts of hazardous material (e.g., 25 mg/L of cadmium) that would be mixed with a larger inventory of radioactive waste (e.g., in a 55-gal drum). The hazardous waste component of individual operations at the proposed facilities would not pose a threat because the quantities would be sufficiently small, and any health hazard would be overshadowed by radiological concerns. Measures taken to control radiological hazards would also protect workers from the small amounts of hazardous constituents in the mixed waste.

Public risk from radiological or hazardous materials would also be negligible because all the waste would be well contained and the overall radiological doses to off-site individuals would only slightly increase (probably unmeasurable). DOE Order 5400.5, *Radiation Protection of the Public and the Environment*, limits the EDE that an off-site individual may receive from all exposure pathways and all radionuclides released from ORR during 1 year to no more than 100 mrem. In 1990, the EDE from exposure through all pathways was 8 mrem, 8% of the DOE Order 5400.5 limit (Kornegay 1991). A small increase due to cumulative impacts from the waste storage activities assessed in this section would not be expected to measurably change current experience, which is well below the DOE limit. The cumulative impact on health and safety of the waste operation facilities would be negligible.

The proposed facilities would represent an increase in radioactive waste inventory in the immediate area, thereby increasing the health hazard to the workers and members of the public who may travel near the area. However, the hazard is passive and could only become a problem (risk) if the radioactive material were to become mobilized during an accident. Operation of numerous storage facilities in an area increases the potential for accidental releases of contaminants to that immediate area but does not materially change the overall potential for accidents per storage facility. Individual incidents do not change in probability; however, with more facilities, there is a greater likelihood for an effect at the region of greater facility density. Even with all the proposed plans, impacts on the public health are anticipated to be well below regulatory limits.

4.3.9 Transportation

Transportation operations associated with the proposed Melton Valley facilities are expected to have negligible cumulative impacts during normal operations. Of the assessments completed (for CH- and RH-transuranic waste storage buildings, Class III/IV Solid LLLW, and LLLW Solidification Project Interim Storage Pad), the transportation risks due to both incident-free and accident conditions have been negligible for each individual facility.

Operating proposed facilities in Melton Valley would not alter the transportation risks of a particular facility, but the operation of multiple facilities could increase the overall health hazard potential to the workers and the public in the immediate area because of the increased cumulative quantities of radioactive waste being shipped. Even after a postulated accident, the effects would be localized and the actions of emergency response teams should prevent any significant population exposures. Increased traffic flow would increase the risk of a vehicular accident, but this fact was considered in this and previous assessments by using conservative traffic volumes and accident rates.

Cumulative risks from shipment of radiological or hazardous materials, therefore, would be expected to remain negligible even during the concurrent operation of multiple facilities. However, it is not possible to quantitatively assess cumulative transportation risk for on-going transportation activities and proposed transportation activities because the information needed to complete this risk assessment is not available for on-going operations. Individual risks associated with each facility would be well below other operational risks—such as worker dose from the package handling—that occurs during waste transfer to storage casks.

4.3.10 Summary

No major cumulative impacts on any potentially affected environments were found to result from this proposed action because of the small areas being disturbed, the lack of anticipated releases, and applicable DOE and ORNL radiation protection standards. The impacts of construction of MVST facilities would make a minor, but detectable, contribution to the cumulative impacts on terrestrial ecology of all currently proposed and reasonable foreseeable future DOE actions on the ORR.

Overall, the cumulative impact from the construction of the proposed action would only add a small increment to the total cumulative impacts on Melton Valley. Each individual project would have a separate analysis to assess the individual impacts, as well as the incremental impacts, to the cumulative effects on Melton Valley. It can also be noted that none of the projects listed in this section on cumulative impacts are connected to the proposed action. Furthermore, the proposed action discussed in this EA would not bias the decision for other waste management actions being addressed in a related programmatic EIS.

5. REGULATORY COMPLIANCE AND AGENCY CONSULTATION

The Resource Conservation and Recovery Act (RCRA) of 1976 is the principal federal legislation governing the management of the hazardous waste component of the LLLW. Applicable EPA regulations implementing RCRA are included in 40 CFR 260 through 271 and 280 through 281. Although RCRA hazardous wastes are expected to be stored in the proposed facility, the facility is exempted from permitting under RCRA [40 CFR 264.1 (g) (6) and 265.1 (g) (10)] as a hazardous wastewater treatment/storage facility because it meets the definitions of a "wastewater treatment unit" and an "elementary neutralization unit" as defined in 40 CFR 260.10 and TN Rule 1200-1-11-.01 (TN effective 2/14/94). Prior to February 1992, submittal of a "permit-by-rule" application for the ORNL wastewater treatment units was required by the state of Tennessee to obtain the wastewater treatment unit exclusion. Under the current state rules, as long as the facility only receives hazardous wastewaters that are generated on-site, the state no longer requires the resubmittal of the "permit-by rule" application to obtain the exclusion. Federal rules do not require that an application be submitted to obtain "permit-by-rule" status; compliance with the NPDES/Clean Water Act

(CWA) permit and recordkeeping conditions satisfy federal requirements.

Actions undertaken as part of the proposed site would comply with the following additional federal statutes and regulations: the Clean Air Act and its amendments; RCRA as amended by the Hazardous and Solid Waste Amendments (HSWA) of 1984; the CWA and its amendments; the Toxic Substances Control Act (TSCA); the Endangered Species Act of 1973; Section 106 of the Historic Preservation Act; OSHA (29 CFR 1910, Subpart G, *Occupational Health and Environmental Controls*, 29 CFR 1910, Subpart I, *Personal Protective Equipment*, 29 CFR 1910, Subpart J, *General Environmental Controls*, 29 CFR 1926, *Safety and Health Standards for Construction*); and 10 CFR 1022, DOE review requirements for floodplains and wetlands. The proposed sites would also comply with Tennessee state laws, including the Tennessee Water Quality Control Act (TCA 69-3-108) and the Tennessee Burial Law (TCA 39-17-311, TCA 39-17-312). In addition, at a minimum, the following DOE orders would be adhered to: DOE Order 5820.2A, "Radioactive Waste Management"; DOE Order 6430.1A, "General Design Criteria"; DOE Order 5480.5, "Safety of Nuclear Facilities"; DOE Order 5480.3, "Safety Requirements for the Packaging and Transportation of Hazardous Material, Hazardous Substances, and Hazardous Wastes"; DOE Order 5480.9, "Construction Safety and Health Program," DOE Order 5480.11, "Radiation Protection for Occupational workers"; DOE Order 5400.5, Radiation Protection of the Public and the Environment," DOE Order 5483.1A, "Occupational Safety and Health Program for DOE Contractor Employees at Government-Owned contractor-Operated Facilities"; and DOE Order 5480.10, "Contractor Industrial Hygiene Program." Handling and storage of ORNL solidified LLLW will also adhere to the policies and procedures established in the ORNL Standard Practices and Procedures Manual.

Consultation with the United States Fish and Wildlife Service is documented in Appendix A as required by the Endangered Species Act of 1973. Appendix A also summarizes the endangered species regulations as they apply to the ORR. Consultation with the SHPO is documented in Appendix C.

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APPENDIX A

ENDANGERED AND THREATENED SPECIES CONSULTATION AND INFORMATION

A.1 COMPLIANCE WITH REGULATIONS FOR THREATENED AND ENDANGERED SPECIES

This appendix summarizes (1) endangered species regulations as they apply to the management of ORR by DOE, (2) recommendations of the U.S. Fish and Wildlife Service (FWS) and the state of Tennessee for endangered species activities on ORR, and (3) DOE actions in response to these recommendations as well as to endangered species regulations. Copies of letters from FWS and the state are included in this appendix. Federal regulations under the Endangered Species Act of 1973 (16 U.S.C. Sect. 1531 et seq.) require that DOE consider the impacts of its actions on plant and animal species listed by FWS as threatened or endangered, on species proposed to be listed as threatened or endangered, and on areas designated or proposed as critical habitats.

A biological assessment (BA) for a proposed site must be submitted to FWS if the action is a "major construction activity" (50 CFR Pt. 402.02) constituting a major federal action significantly affecting the quality of the human environment and if a listed species or critical habitat may be affected [50 CFR Pts. 402.01(a) and 402.12]. Whether a proposed project is a major construction activity constituting a major federal action (40 CFR Pt. 1508.18) significantly affecting the quality of the human environment is determined by an environmental assessment (EA) (40 CFR Pt. 1508.9) prepared in accordance with the National Environmental Policy Act. If a threatened or endangered species would be affected by a small DOE construction project, the project might have to be defined as "significantly" (40 CFR Pt. 1508.27) affecting the environment and as a major federal action requiring an EIS in accordance with 40 CFR

Pt. 1502.3. If a BA determines that a listed species or critical habitat (or species or habitat proposed for listing) may be affected, DOE must request formal consultation with FWS. A BA is not required for a project that is not a major construction activity or major federal action.

If DOE determines that a proposed minor construction project may affect a listed species, DOE must request formal consultation with FWS. If DOE determines that no impact would occur, no formal consultation is required. Informal consultation with FWS is optional (50 CFR Pt. 402.13).

During any consultation, FWS may recommend discretionary studies or surveys (e.g., Barclay 1990; Bay 1991) that may provide a better information base for assessing impacts on listed species [50 CFR Pt. 402.12(d)(2)]. Such studies are optional and not required.

The Tennessee Code Annotated, Title 70, Chapter 8, and regulations of the Tennessee Wildlife Resources Commission protects animal species listed by the state as endangered, threatened, or in need of management. No person or agency may knowingly destroy a listed species or its habitat without a permit from the state.

Plant species listed by the Tennessee Department of Conservation are provided limited protection by the Tennessee Rare Plant Protection and Conservation Act of 1985 (Tennessee Code Annotated, Title 11–26, Sects. 201–214). This act protects listed plants from indiscriminate collecting by plant collectors but does not prohibit landowners such as DOE from destroying listed plants on their own property. Thus, apart from federal requirements, DOE is not required to perform surveys for state-listed plants or to ensure that its proposed sites do not impact listed plants. Nevertheless, DOE attempts to protect all state-listed plant species occurring on ORR.

A summary of the above regulations charges DOE to ensure protection of animals listed under the Endangered Species Act, plants listed under the Endangered Species Act, and animals listed by the Tennessee Wildlife Resources Commission. DOE is not required by state regulations to protect state-listed plant species on its own property.

A.2 FISH AND WILDLIFE SERVICE RECOMMENDATIONS

FWS has made the following recommendations.

1. On-site surveys (discretionary) should be conducted whenever a proposed project would result in loss or disturbance of aquatic or terrestrial habitat (Barclay 1990; Bay 1991).
2. During the early planning stages of any construction that would adversely impact aquatic or terrestrial habitat, potential effects to endangered or threatened species should be assessed and a determination made about whether construction or operation may affect them (Barclay 1990).

A.3 STATE OF TENNESSEE RECOMMENDATIONS

The TWRA and the Tennessee Department of Conservation are being requested to provide written descriptions of any surveys and documentation required for compliance with state law.

A.4 DOE ACTIONS CONCERNING STATE AND FEDERAL RECOMMENDATIONS

Personnel. The DOE Resource Management Organization for ORR includes two persons designated for coordination of issues concerning threatened and endangered species—one person for plant species and one for animal species. These individuals serve as coordinators for consultation with state and federal agencies and surveys for listed plants and animals on ORR. Activities of the DOE National Environmental Research Park on ORR also support studies of listed species, primarily plant species that are known to occur on ORR; however, no staff positions are designated and funded specifically for surveys or studies of listed species. Therefore, such surveys and studies are limited.

Planning and documentation. As part of the planning process for construction projects, DOE has prepared literature reviews and conducted surveys to determine whether any listed plant or animal species would be affected. The two endangered species coordinators of the Resource Management Organization have reviewed literature and other information on the status of listed plants and animals on ORR (Kroodsma 1987; Parr 1984).

Field surveys are conducted as necessary, and documentation is provided in categorical exclusions, EAs, and EISs. If an FWS-listed species or a species proposed for listing could be affected by a proposed minor construction project being addressed by an EA, formal consultation would be requested with FWS; however, because no such species is known to occur on ORR, formal consultation has not been requested. A BA would likely be prepared for any major construction activity constituting a major federal action. If breeding or nesting habitat of a state-listed animal species would be affected, DOE would apply for an appropriate permit from the TWRA.

Surveys. There is no evidence that any FWS-listed plant species occurs on ORR (Table A.1). Therefore, surveys for rare plants are not required. Nevertheless, an attempt is made to conduct plant surveys for all state-listed and FWS-listed plants at all sites with natural habitats that would be affected by construction or operation of a proposed project. Many state-listed plant species occur on ORR and are sometimes found on proposed construction sites.

There is also no evidence that any FWS-listed animal species occurs on ORR (Table A.1). Therefore, surveys are not required. The Indiana bat is the only FWS-listed animal species for which there was sufficient evidence to indicate the possibility of its presence on ORR and to justify field surveys. Field surveys were conducted during the spring and summer of 1992 in habitat that appears suitable for this species (floodplain of East Fork Poplar Creek). No Indiana bats were found during

Table A.1. Status of rare species on the Oak Ridge Reservation*1*	·	·	·
·	·	Legal status*2*	·
Species	·	Federal	State
Plants	·	·	·
Aureolaria patula	spreading false foxglove	C1	E
Cimicifuga rubifolia	Appalachian bugbane	C2	T
Delphinium exaltatum	tall larkspur	C2	E
Juglans cinerea	butternut	C2	E
Cypripedium acaule	pink lady-slipper		E
Liparis loeselii	fen orchid		T
Diervilla lonicera	northern bush-honeysuckle		T
Fothergilla major	mountain witch-alder		T
Hydrastis canadensis	goldenseal		T
Lilium canadense			T

	Canada lily		
Panax quinquifolius	ginseng		T
Platanthera flava var hebiola	tuberculed rein-orchid		T
Platanthera peramoena	purple fringeless orchid		S
Elodea nuttallii	Nuttall's waterweed		S
Saxifraga careyana	Carey's saxifrage		S
Spiranthes ovalis	lesser ladies tresses		
Fish	·	·	·
Polyodon spathula	paddlefish	C2	NM
Phoxinus tennesseensis	Tennessee dace		
Amphibians and reptiles			
Aneides aeneus	green salamander	C2	NM
Cryptobranchus alleganiensis	hellbender	C2	NM
Cnemidophorus sexlineatus	six-lined racerunner		NM
Notophthalmus viridescens	eastern newt		NM
Trachemys scripta	pond slider		NM
·	Birds	·	·
Haliaeetus leucocephalus3	bald eagle	E	E
Aimophila aestivalis4	Bachman's sparrow	C2	E
Ammodramus henslowii3	Henslow's sparrow	C2	T
Chlindonias niger3	black tern	C2	E
Dendroica cerulea4	cerulean warbler	C2	T
Lanius ludovicianus	loggerhead shrike	C2	T
Thyromanes bewickii	Bewick's wren	C2	T
Pandion haliaetus3	osprey		T
Ammodramus savannarum4	grasshopper sparrow		
Accipiter striatus	sharp-shinned hawk		
Accipiter cooperii	Cooper's hawk		
Circus cyaneus3	northern harrier		

Table A.1. (continued)	·	·	·
·	·	Legal status2	·
Species	·	Federal	State
Buteo lineatus	red-shouldered hawk	·	NM
Coragyps atratus	black vulture		NM
Limnothlypis swainsonii4	Swainson's warbler		NM
Melanerpes erythrocephalus	red-headed woodpecker		NM
Nycticorax nycticorax	black-crowned night-heron		NM
Phalacrocorax auritus3	double-crested cormorant		NM
Sphyrapicus varius3	yellow-bellied sapsucker		NM
Tyto alba	common barn owl		NM
Mammals	·	·	·
Felis concolor5	eastern cougar	E	NM
Sorex longirostris	southeastern shrew		

*1*From Parr and Evans (1992), Cunningham et al. (draft).

*2*E = endangered, T = threatened, C1, C2 = candidate, NM = in need of management, S = special concern in Tennessee.

*3*Uncommon visitor or migrant. Does not currently nest on ORR.

*4*Summer

*5*Frequently reported, but no conclusive evidence of the presence of a cougar population

(Kroodsma 1987).

this survey. Also, incidental or reconnaissance surveys for state-listed and FWS-listed animal species are conducted occasionally for proposed construction projects.

A.5 REFERENCES

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APPENDIX B

FIELD SURVEY MEMOS

APPENDIX C

DOE CONSULTATION WITH THE STATE HISTORIC PRESERVATION OFFICER

APPENDIX D

NOTICE OF FLOODPLAIN/WETLANDS INVOLVEMENT FOR ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT ACTIVES AT THE DOE OAK RIDGE RESERVATION, OAK RIDGE, TENNESSEE